



Western Washington University
Western CEDAR

Salish Sea Ecosystem Conference

2014 Salish Sea Ecosystem Conference
(Seattle, Wash.)

May 2nd, 1:30 PM - 3:00 PM

The 2006-2009 Puget Sound Land-Use/Land-Cover Change Map

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Pierce, Kenneth; Quinn, Timothy P. (Thomas Peter); Miller, Jeanne; and Samson, Kevin, "The 2006-2009 Puget Sound Land-Use/Land-Cover Change Map" (2014). *Salish Sea Ecosystem Conference*. 118.
<https://cedar.wwu.edu/ssec/2014ssec/Day3/118>

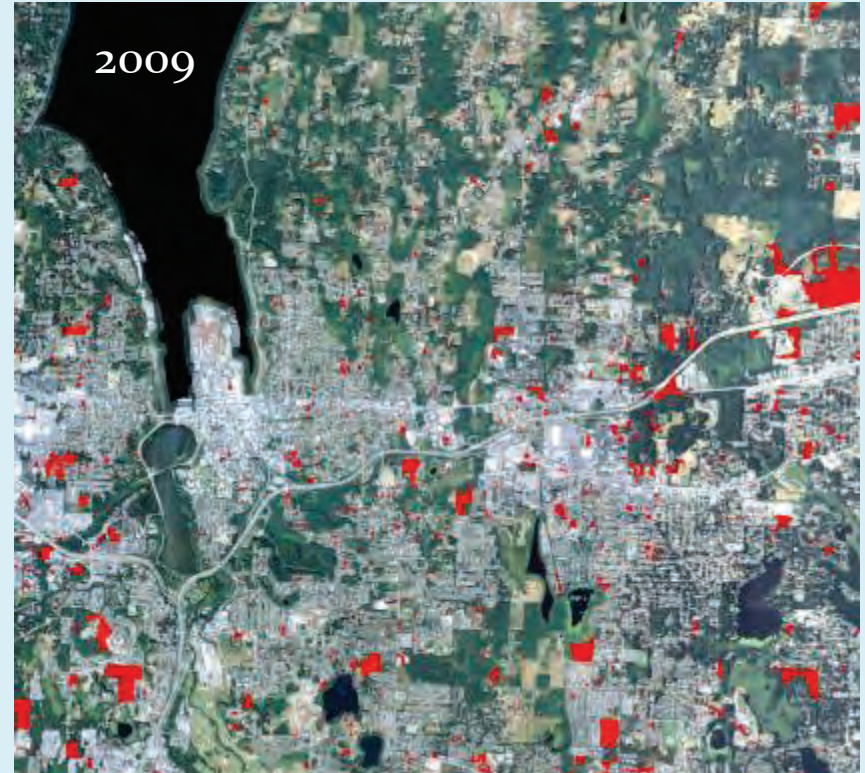
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The Puget Sound Change Map:

Mapping Puget Sound urbanization and forestry activities from 2006-2009 using high-resolution (1-m) imagery data

Kenneth B. Pierce Jr., Kevin Samson, Jeanne Miller, Timothy Quinn
WDFW Habitat Science Division

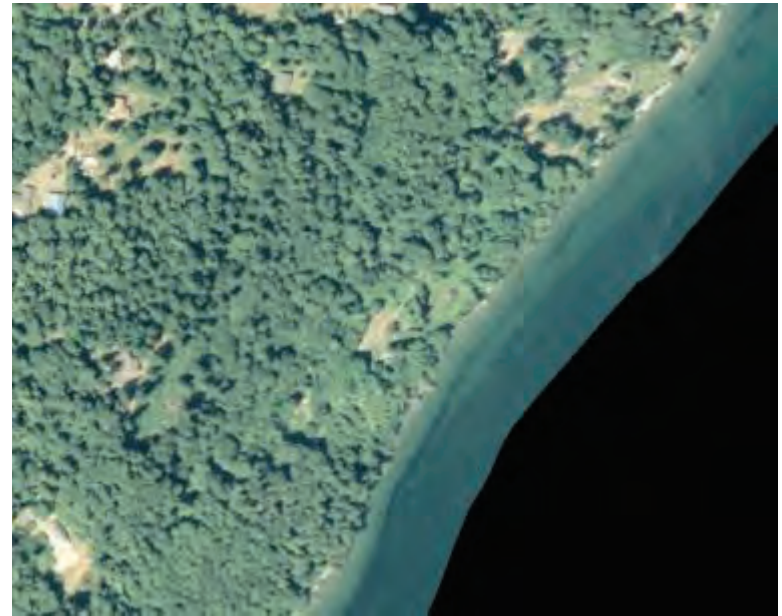
May 2, 2014



Two views of the shore



Landsat 30-m pixel
139-ft diagonal



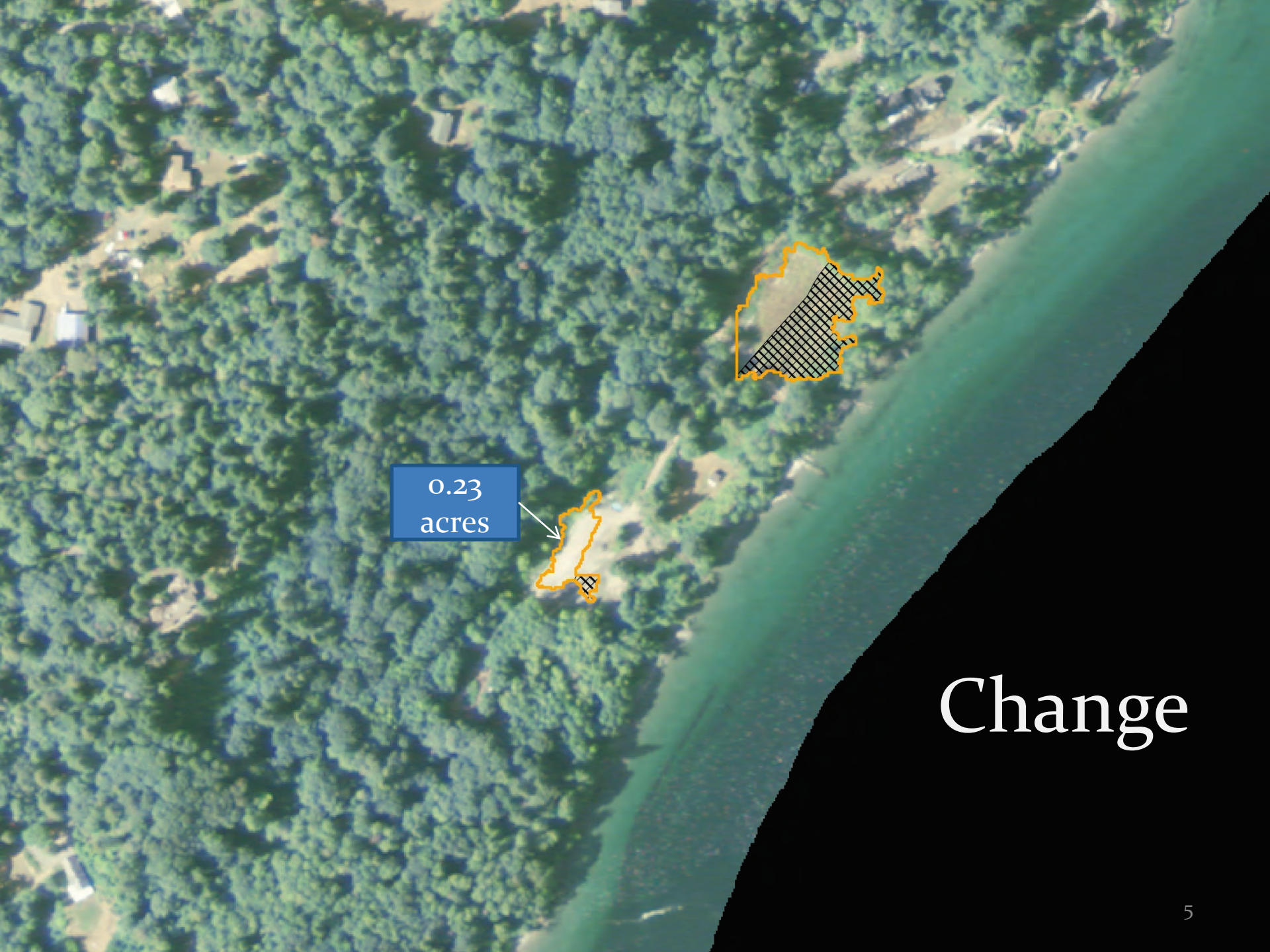
NAIP 1-m pixel
4.6-ft diagonal



2006



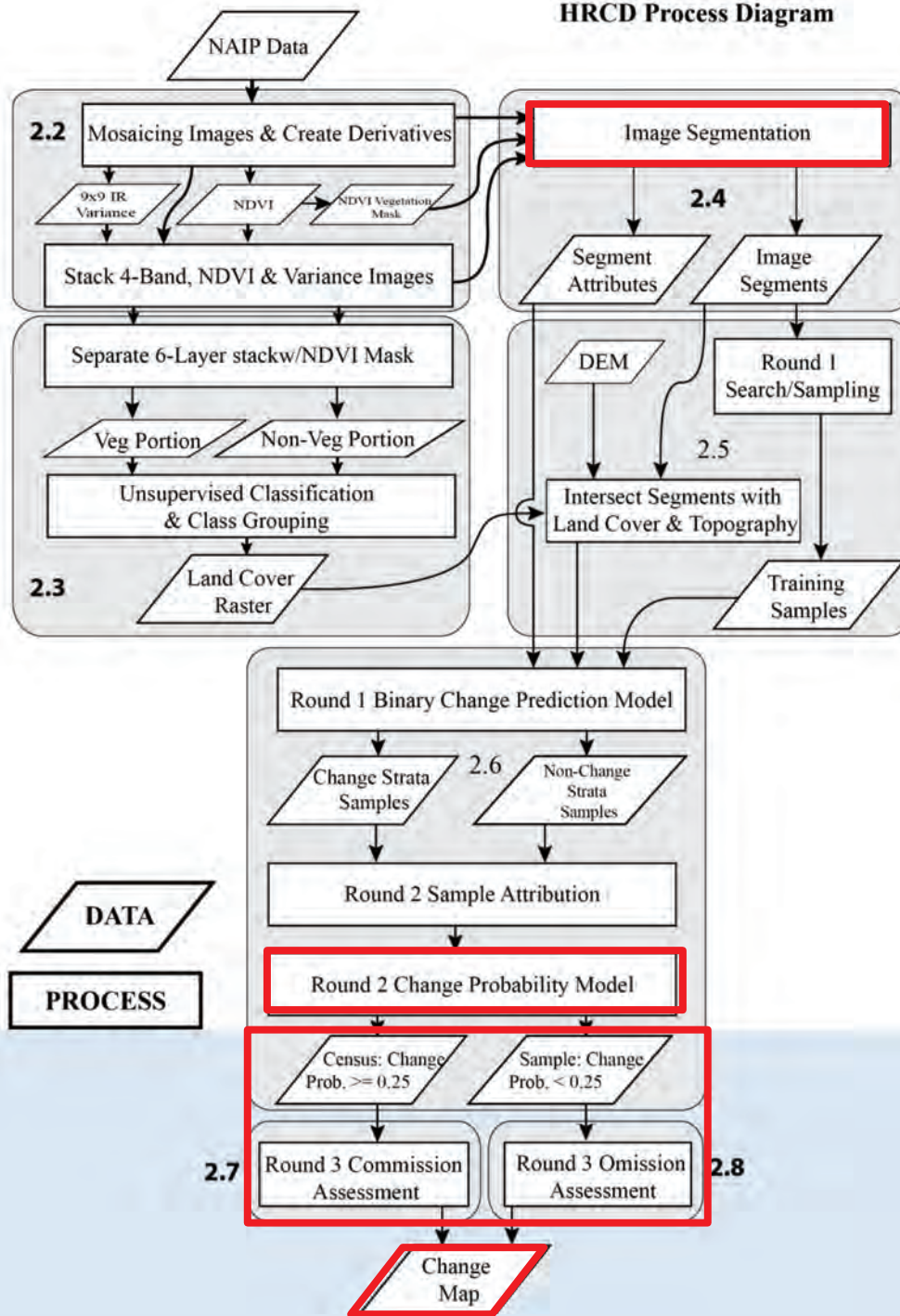
2009



0.23
acres

Change

HRCO Process Diagram



Mostly Automated

Mostly Manual

Change Map Data

- Each mapped change location has up to six analyst assigned attributes:
 - Starting land cover (2006)
 - Change percentage (all in 25% increments)
 - Decrease in tree cover
 - Increase in impervious surface
 - Increase in semi-pervious surface
 - Change type/agent (4 primary classes)

Change Types/Agent

1. Development
2. Forestry
3. Tree Removal
4. Stream/hydrologic change
5. Redevelopment
6. Retention Pond
7. Other Natural
8. Other Non-natural

Forest to Developed Example



Cover: Tree/shrub

Area: 16.9 acres



Change Type: Development

Changed area: 100%

Tree decrease: 100%

Impervious increase: 50%

Semi-pervious increase: 25%

Mixed to Developed Example



Cover: Mixed Non-built

Area: 0.68 acres



Change Type: Development

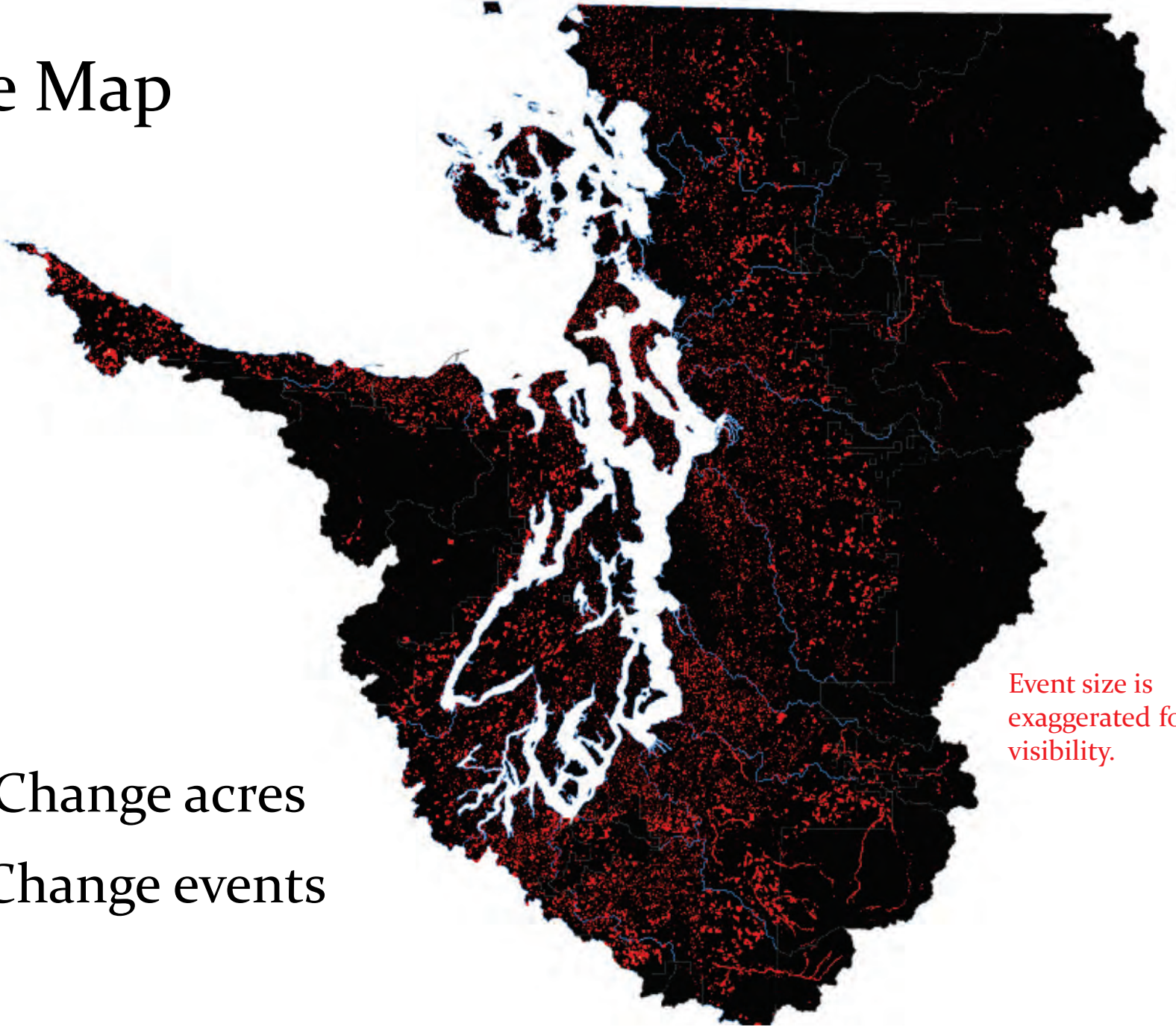
Changed area: 50%

Tree decrease: 25%

Impervious increase: 25%

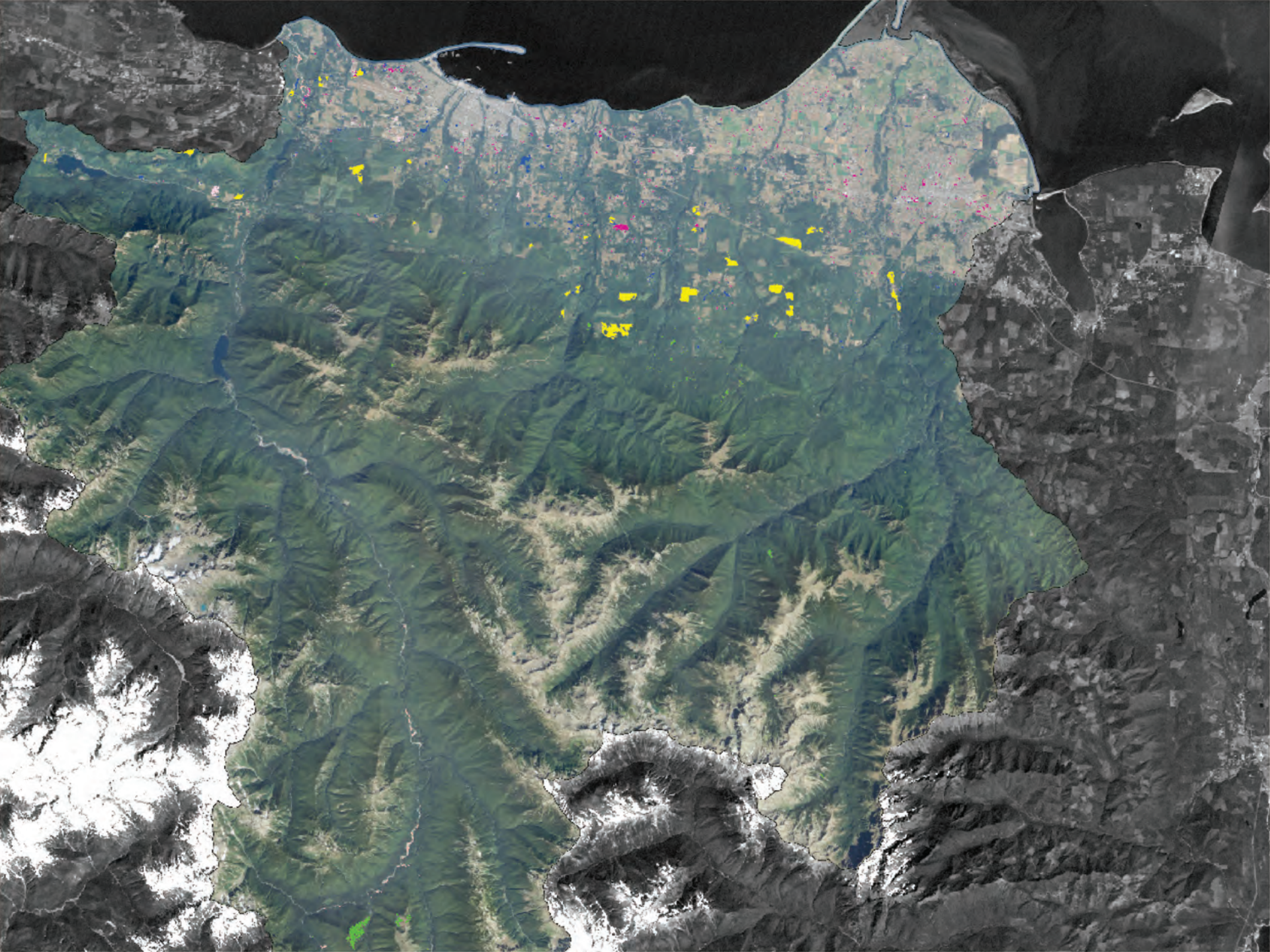
Semi-pervious increase: 25%

The Map

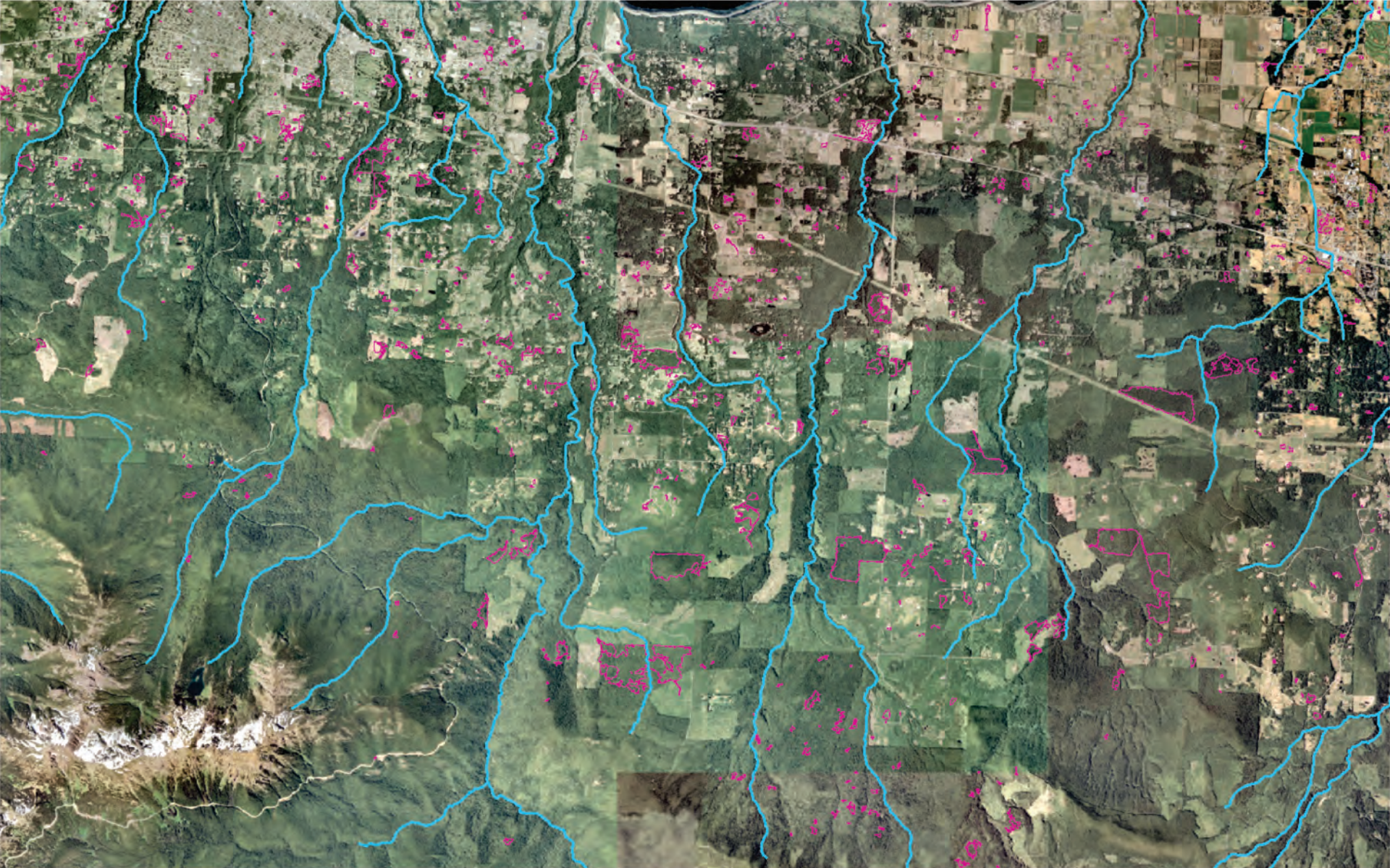


86,097 Change acres
35,340 Change events

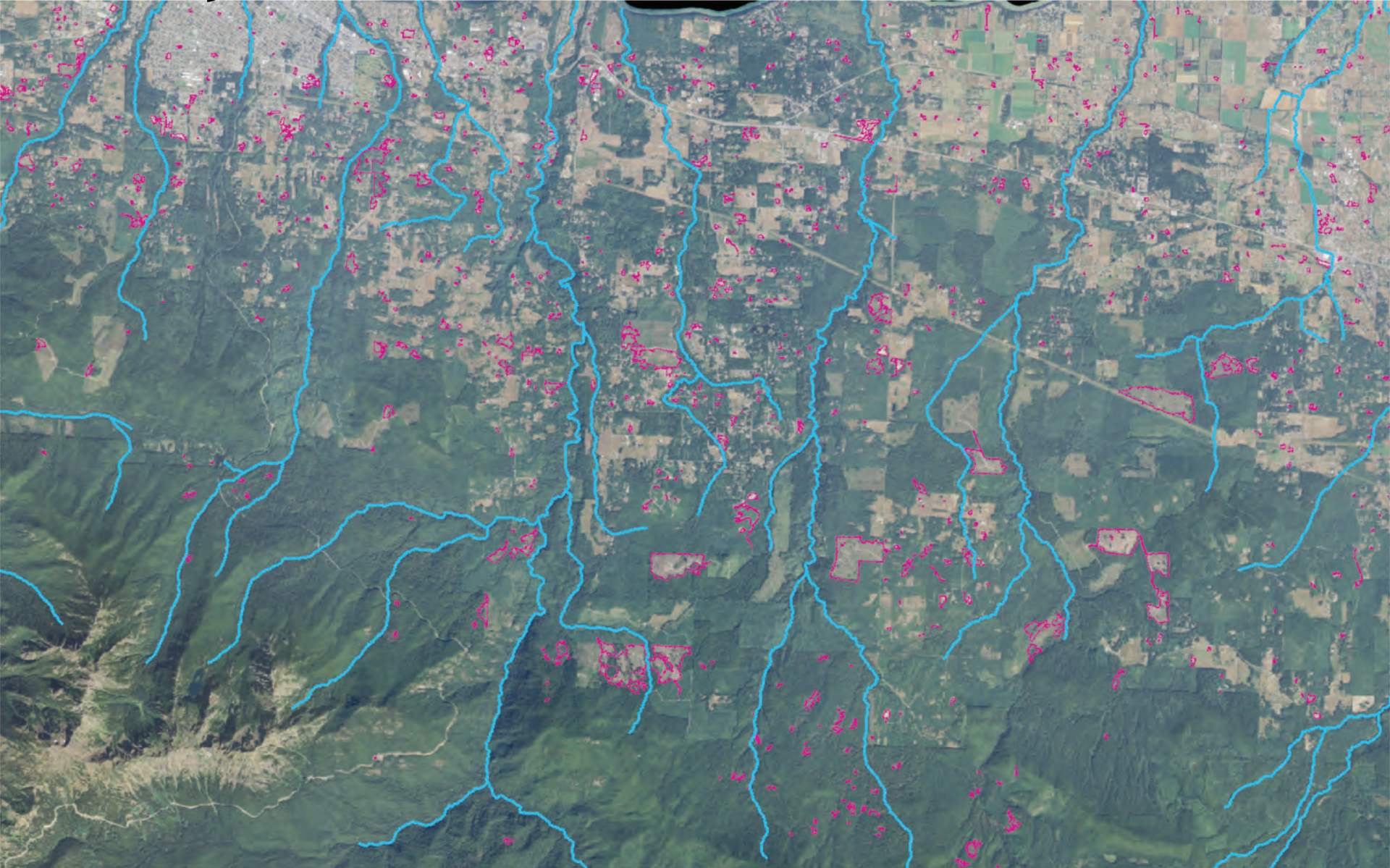
Event size is
exaggerated for
visibility.



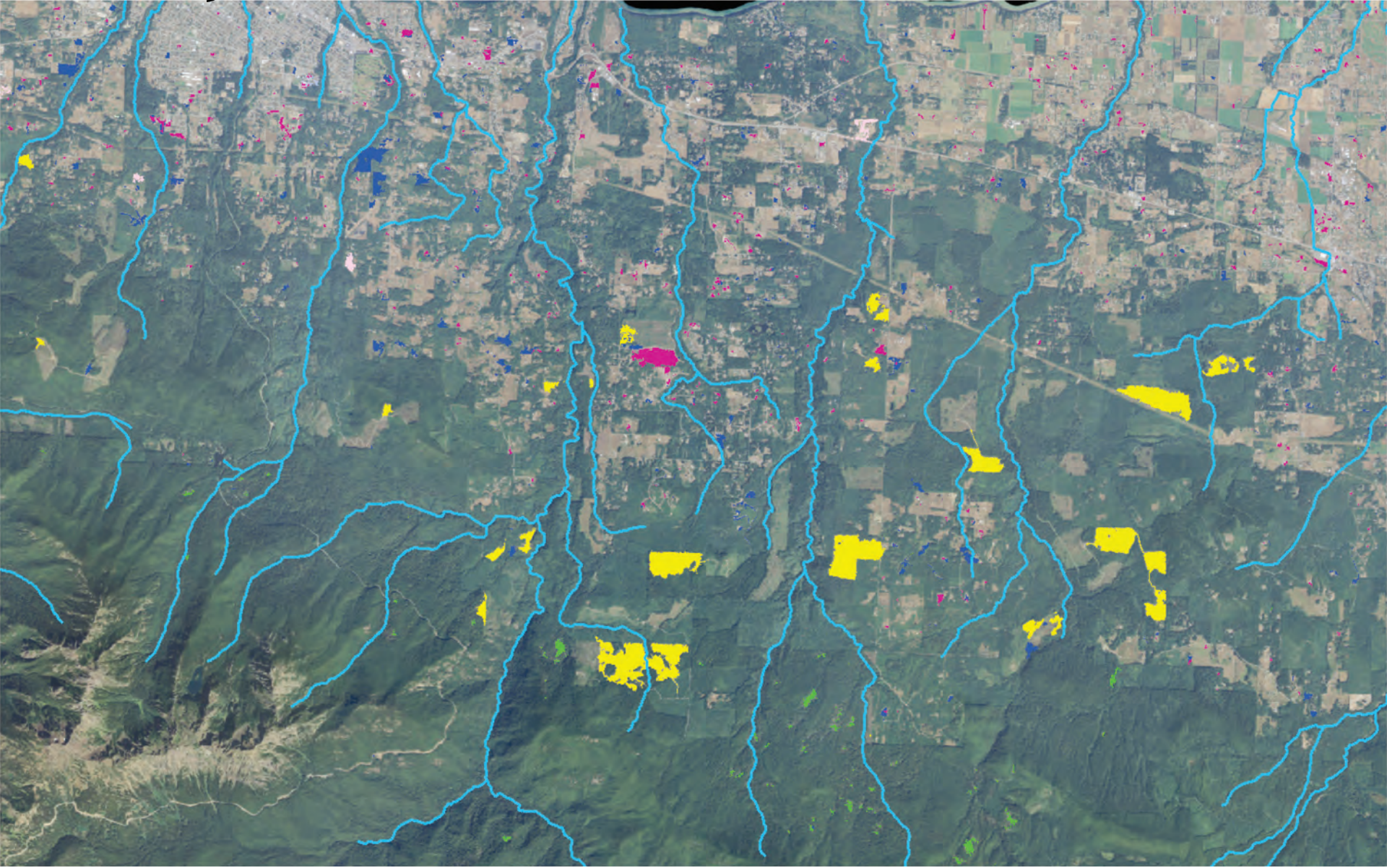
2006 North-central WRIA 18, Clallam Co.



2009 North-central WRIA 18, Clallam Co.



2009 North-central WRIA 18, Clallam Co.

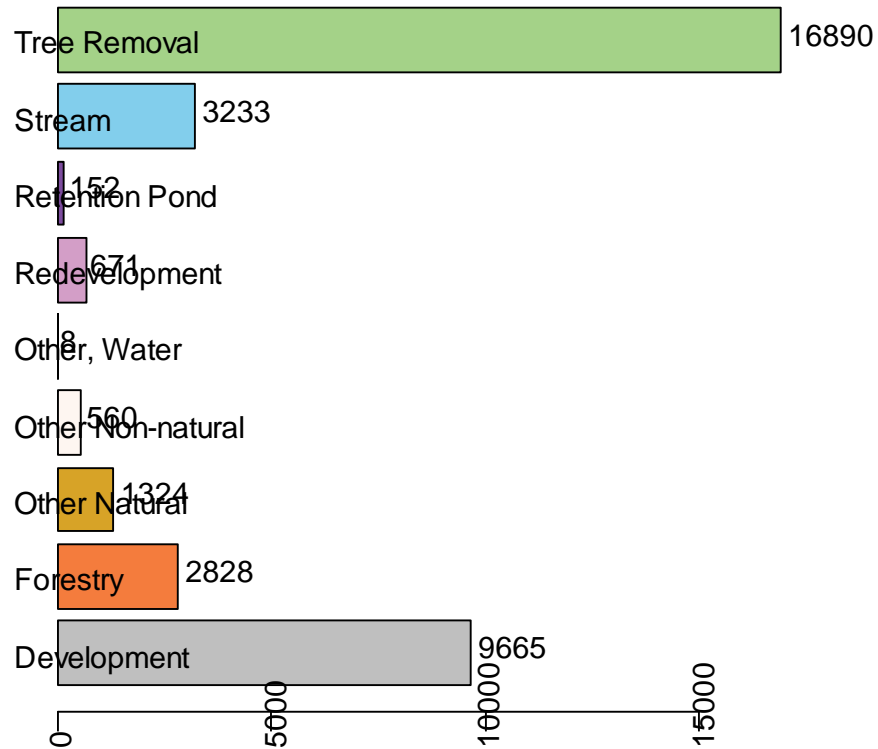


 Forestry  Tree Removal  Development  Natural

Change by Type (locations)

35,340 Change events

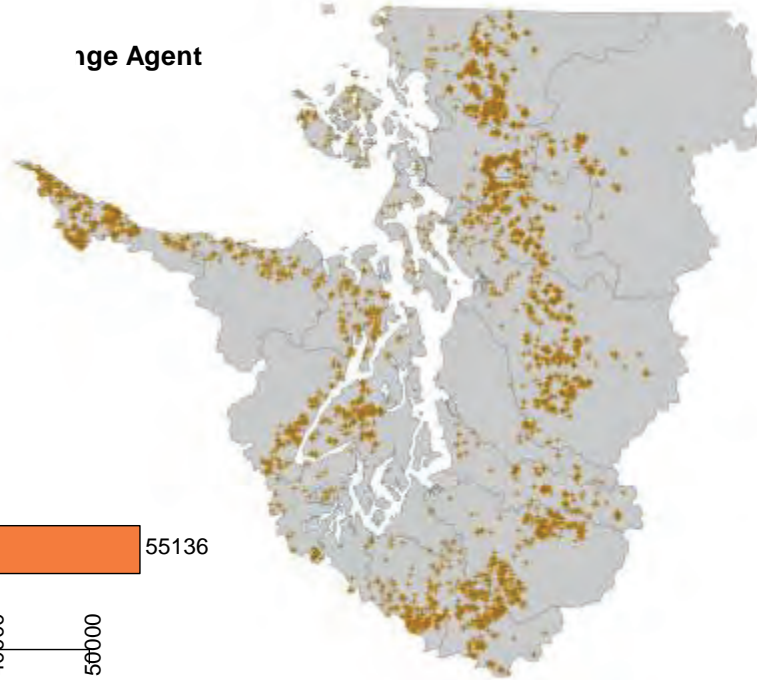
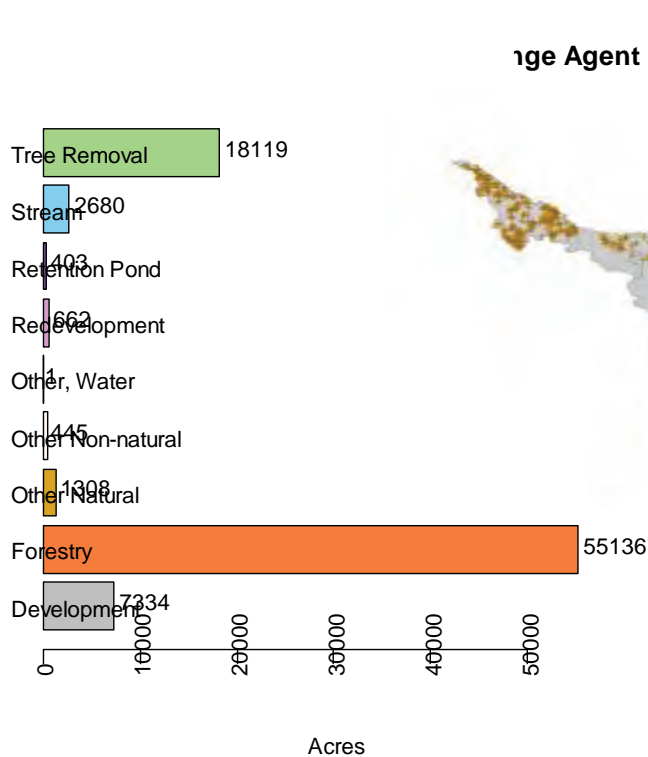
Change Agent



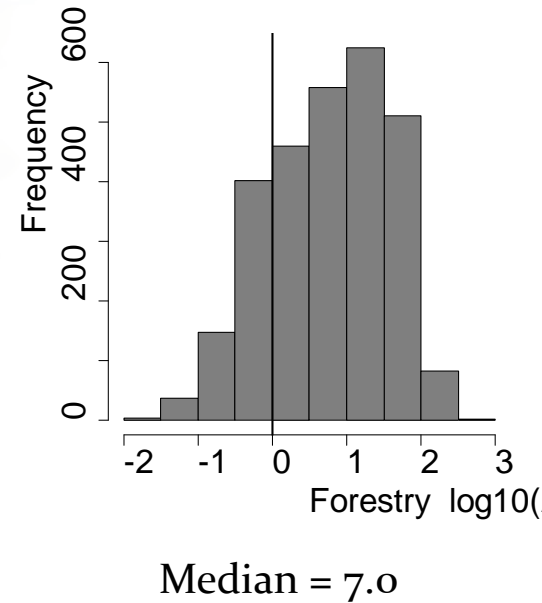
Locations

Change by Forestry (acres)

86,097 Change acres

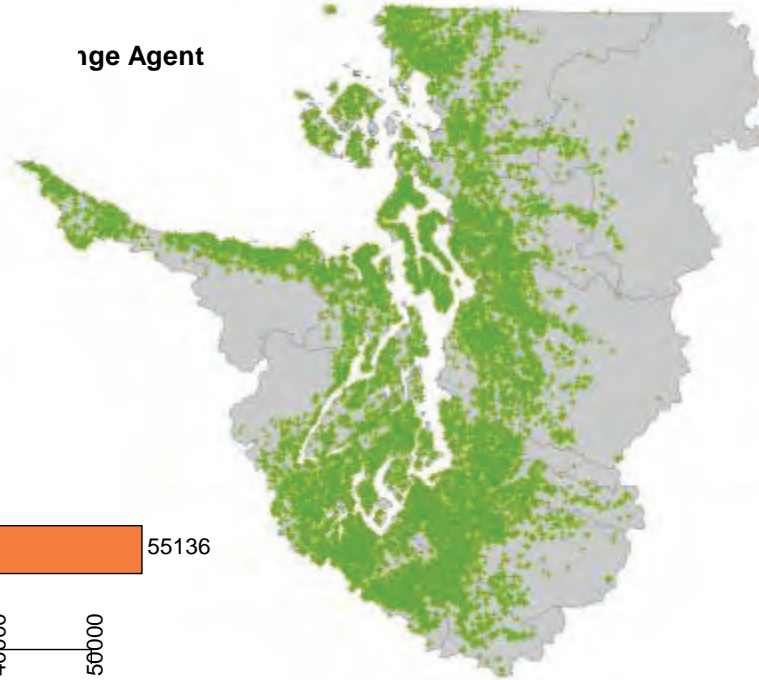
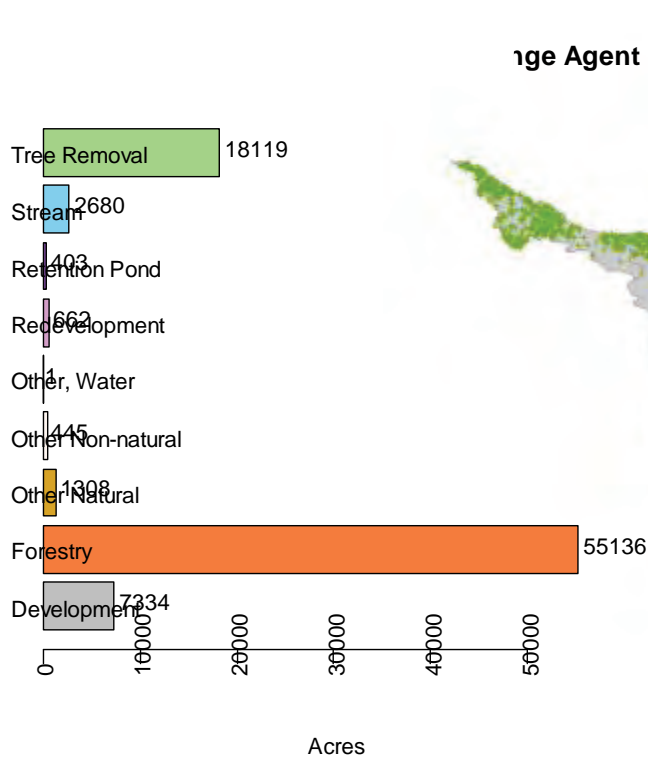


Forestry
Locations (2,820)

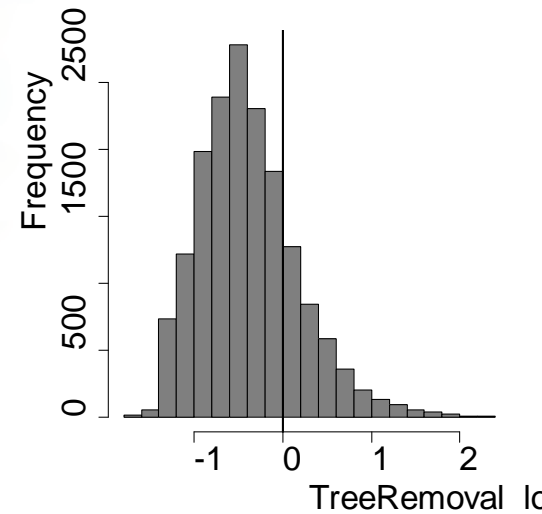


Change by Tree Removal (acres)

86,097 Change acres



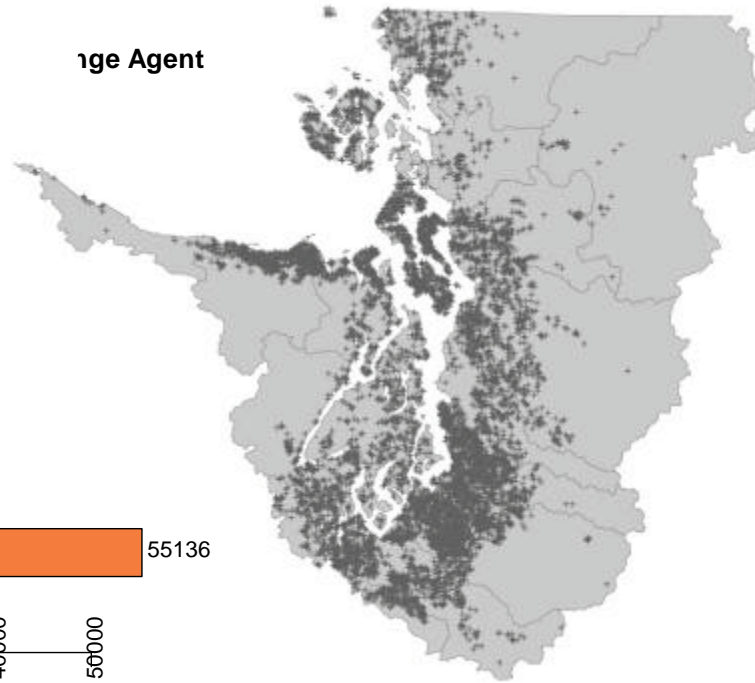
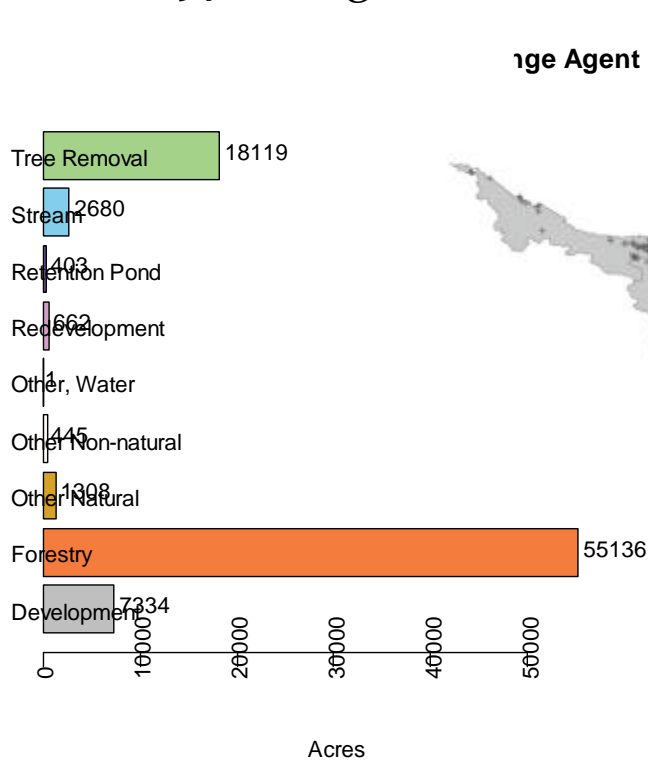
Tree Removal
Locations (16,890)



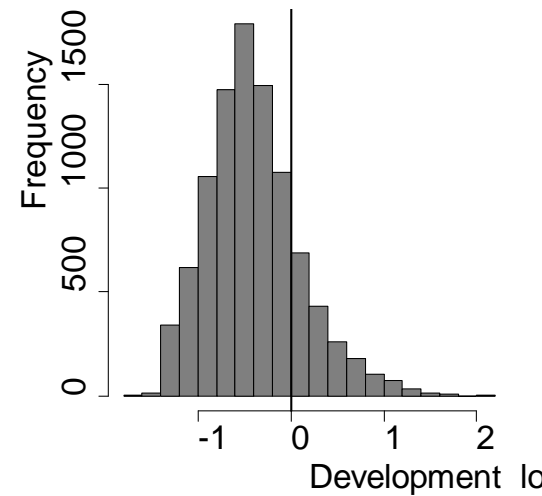
Median = 0.35

Change by Development (acres)

86,097 Change acres



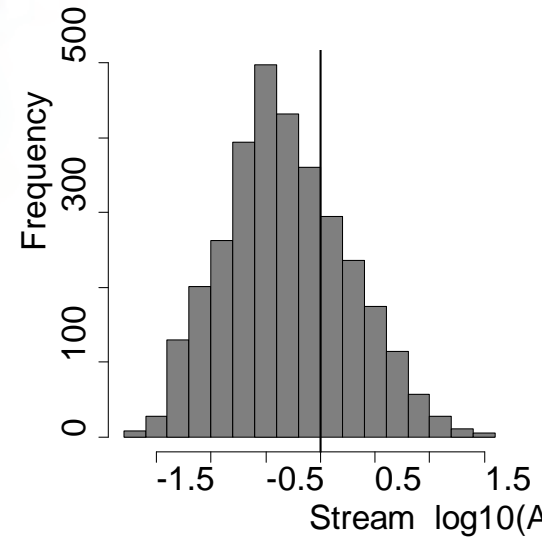
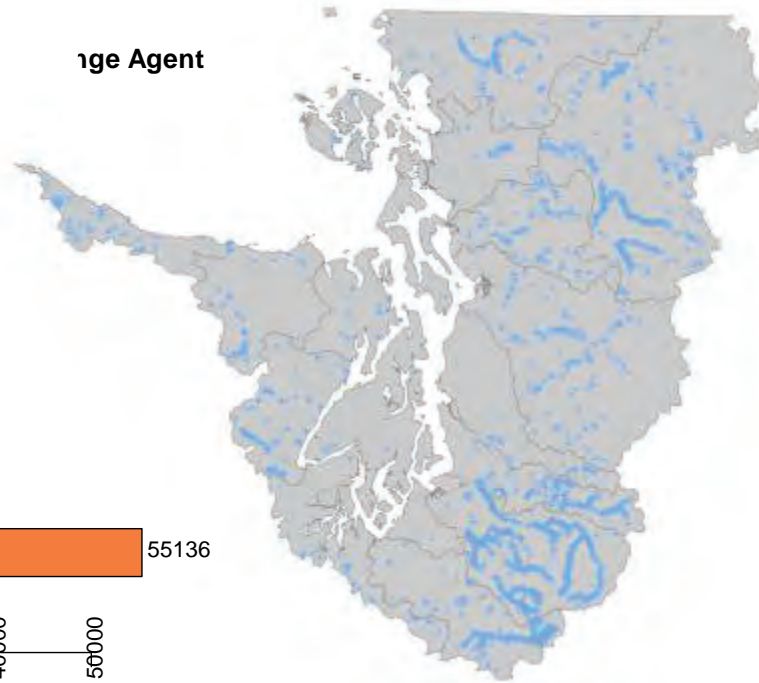
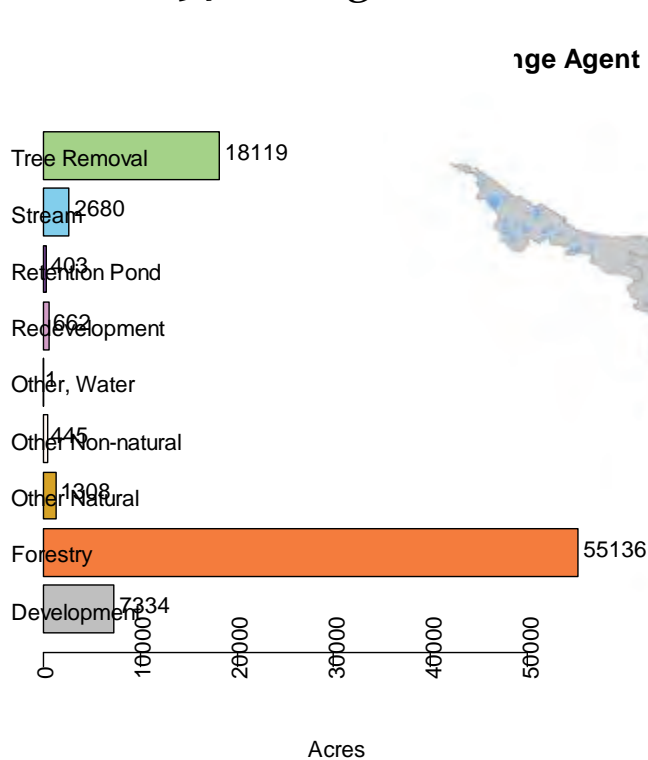
Development Locations (9,665)



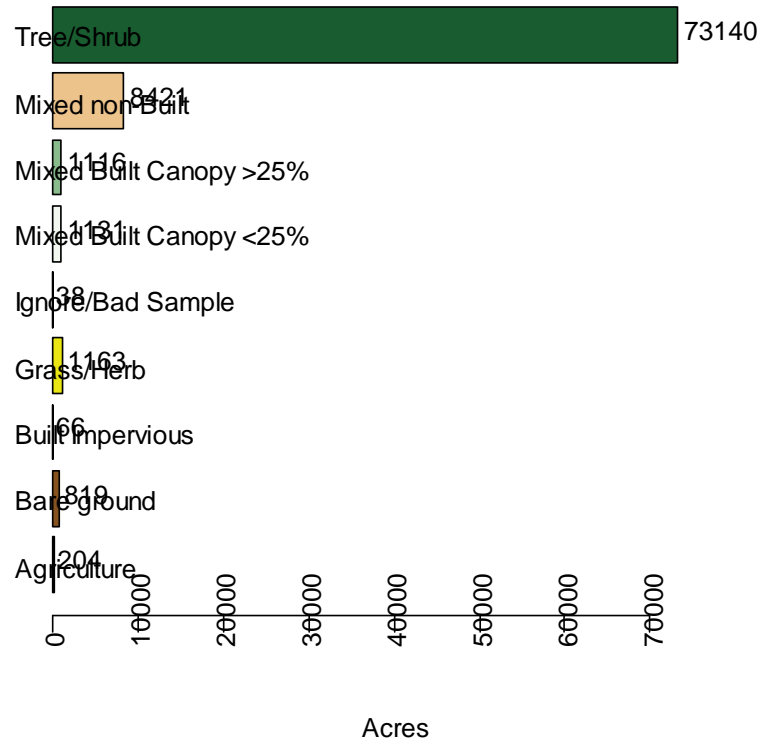
Median = 0.35

Change by Stream (acres)

86,097 Change acres



Change by 2006 Land Class



Post-mapping intersect analyses

- Most interesting analysis comes from the intersection with other data sources
 - Urban Growth Boundaries
 - Riparian/Shoreline areas
 - Protected Areas
 - Floodplains
 - Regulatory areas of interest
 - Permit/zoning data
 - Water quality/ environmental monitoring data
- Error reduction VITAL to intersection analyses

4 Major Points

- HRCD (High Resolution Change Detection) builds on decades of LULCC science and remote sensing methods.
- In contrast to existing change products, HRCD provides “locally-relevant” data at broad extents.
- Output data consists of mapped change locations with 4 additional attributes:
 - percent change, tree loss, impervious increase, change agent
- HRCD is achievable, cost-effective, repeatable, transparent and provides quantification of error throughout the assessment

HRCDD in 2014

- Data available now
- Website in Fall 2014
- Phase 2 2009-2011 Analysis
- Create policy-relevant analyses/use-cases from HRCDD data with 3-4 local partners
- Pursue funding for Phase 3 2011-2013 change detection (as recommended on page 67 of “Puget Sound Salmonid Habitat Monitoring Inventory and Recommendations 2013)

- Funding provided by:
 - EPA Lead Organization Grants administered by Dept. of Ecology and Dept. of Commerce
 - Recreation & Conservation Office
 - Dept. of Ecology Wetland Grant
 - Salmon Recovery Funding Board